The Challenge of Chronic Physical and Mental Disease to Environmental Sanitarians

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ENVIRONMENTAL SANITARIANS need to deal with a number of new problems beyond their traditional programs if they are to help reduce the mortality and morbidity associated with chronic physical and mental disease. Acting on this premise, the 1978–79 president of the National Environmental Health Association, Paul Taloff, appointed a Task Force on Chronic and Mental Health Disease (see box). Among its responsibilities, the task force was charged with the need to "articulate the scope of responsibilities for environmental health sanitarians within the chronic and mental health disease areas" and to "identify the knowledge and skills required by the environmental health sanitarians to participate in the prevention and control of chronic and mental health diseases."

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Although the task force has not yet fulfilled its charge, the first stage of its work has been completed and reported. The first task force report gives an overview of the problems with which environmental sanitarians must deal if they are to effectively involve themselves in reducing the mortality and morbidity associated with chronic disease and mental health problems. Some specific information on chronic disease, especially cancer, is provided; mental health and stress factors associated with the environment are identified; and possible knowledge and skills that environmental sanitarians might use or explore are outlined. Selected material from the first task force report is presented here.

Environmental Factors and Chronic Disease

Current mortality records show that the two leading causes of death in the United States are heart disease and cancer. According to a 1978 report to Congress by the Task Force on Environmental Cancer and Heart and Lung Disease, these two diseases combined with lung disease account for approximately 60 percent of

the total annual deaths in the United States (*1*). There is evidence to indicate that many cancer rates have stabilized or decreased, but the cancer incidence for some specific body sites has increased since 1900 at a rate much higher than can be accounted for by population growth and aging of the population (*1a*). For example, lung cancer rates have risen exponentially over the past 30 years, and although much of this increase has been attributed to smoking, it is also suspected that at least part of the increase can be attributed to other personal and community environmental factors.

The table shows that death rates for diseases of the heart, although significantly high, have been declining since 1950, and particularly since 1970. Accidental deaths, the fourth leading cause of deaths for all persons in the United States, have also been decreasing although, as pointed out by Kenneth Holt, Environmental Health Consultant, Center for Disease Control, in a personal communication dated July 17, 1979, "These deaths and injuries in the home, recreational environment, and certain farm environments are a public health problem of cardinal significance for which no identifiable Federal focus and limited State and local efforts exist." Since, however, accidents are not considered a chronic problem, they have been omitted from this report. Nonetheless, they represent a challenging opportunity for expanded practice for the sanitarian that should not be ignored.

In contrast to the decline in the rates for heart diseases and accidental deaths, cancer rates have continued upward, slowly but steadily, rising about 0.7 percent per year. Hence, although all chronic diseases are obviously of concern and efforts to reduce heart and respiratory diseases must not slacken, perhaps the major public health emphasis needs to be on cancer.

Age-adjusted death rates for selected causes of death, United States, 1900–76

Year	Malignant neoplasms	Heart disease	Influenza, pneumonia	Accidents	Homicides
1900	79.6	167.3	209.5	75.3	1.2
1905	90.9	198.7	175.5	85.4	2.1
1910	97.0	201.7	163.0	88.4	4.5
1915	100.8	206.3	154.7	77.4	6.0
1920	104.9	203.5	213.1	74.0	6.9
1925	112.5	229.5	128.1	81.9	8.5
1930	112.4	252.7	108.2	84.6	9.2
1935	117.5	269.0	109.2	80.7	8.6
1940	120.3	292.7	70.2	73.1	6.3
1945	119.9	282.4	45.6	68.7	5.8
1950	125.4	307.6	26.2	57.5	5.4
1955	125.8	287.5	21.0	54.4	4.8
1960	125.8	286.2	28.0	49.9	5.2
1961	125.4	278.6	22.1	48.1	5.2
1962	125.6	282.7	23.7	49.7	5.4
1963	126.7	285.4	27.7	50.9	5.5
1964	126.7	276.9	22.8	52.1	5.7
1965	127.9	275.6	23.4	53.4	6.2
1966	128.4	275.8	23.8	55.6	6.7
1967	129.1	267.7	20.8	54.8	7.7
1968	130.2	270.0	26.8	55.1	8.2
1969	129.7	262.3	24.6	55.3	8.6
1970	129.9	253.6	22.1	53.7	9.1
1971	130.7	252.0	19.3	52.0	10.0
1972	130.7	249.3	20.8	52.0	10.3
1973	130.7	244.4	20.1	51.7	10.5
1974	131.8	232.7	16.9	46.0	10.8
1975	130.9	220.5	16.6	44.8	10.5
1976	132.3	216.7	17.4	43.2	9.5

SOURCE: Reference 2a.

In recent years a variety of events have had an impact on our environment that in all probability have a significant bearing on current cancer rates. The fantastic array of chemicals for many purposes produced by the synthetic chemical industry is one such example. As many as 2,000 new chemicals may be introduced into our environment annually (*1b*). Chemicals have permeated all aspects of our lives. And because with their complex interactions, they present significant problems in use, storage, and transfer, these substances are a community health concern. The kepone incident and Love Canal have probably been our most publicized examples of tragedies involving chemicals. In the mid-seventies it was discovered that Love Canal, a chemical dump that had been deeded to Niagara Falls, N.Y., in 1953, harbored more than 80 chemicals, including several suspected carcinogens or teratogens (*3*). Evidence of the chemical presence is everywhere in the United States, from Great Lakes sports fish containing high levels of mirex (an insecticide that produces cancer and neurological and metabolic deficits in laboratory animals) to nitrosamines in the air over Baltimore, Md. Drinking water contaminants have been linked to both heart disease and cancer in several communities. Among the proven or presumptive human carcinogens are asbestos, polybrominated biphenols, trichlorethylene, some ingredients of synthetic rubbers, and a host of other industrial and agricultural compounds, food additives, and drugs —substances accounting for perhaps 10 percent of the estimated 10,000 chemicals prevalent in the environment (*4*).

The pertinent question is: How many health agencies or environmental sanitarians are making any concerted effort to obtain information on the chemicals in use in their communities? Even though under Public Law 92–500, the Environmental Protection Agency and the States are making an inventory of hazardous chemicals, funding limitations and other program priorities may limit the effectiveness of that effort. Much remains to be done, and until we environmental sanitarians know what the grassroots problems are and can define them, we can do little to protect the public from unsuspected hazards. Baseline information and monitoring are badly needed.

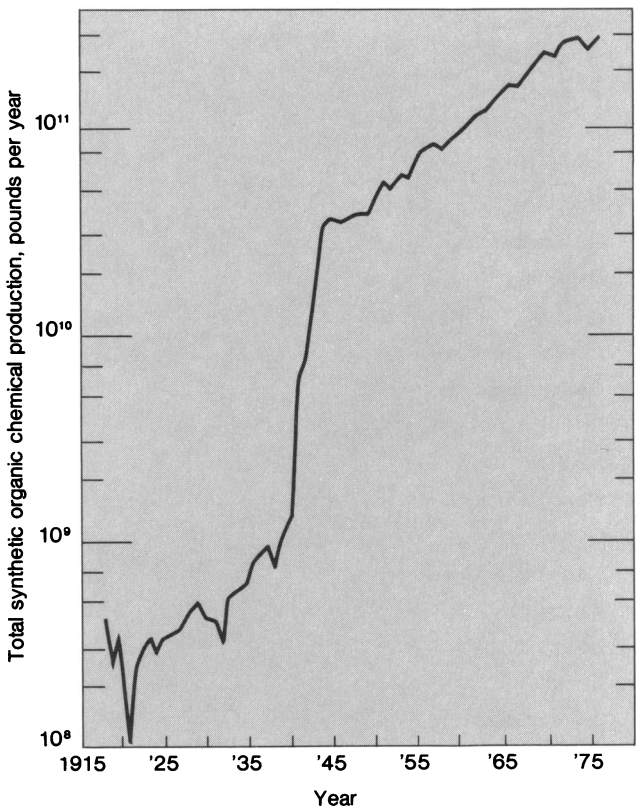
This emphasis on toxic chemicals is not meant to suggest that all efforts should be directed to them at the expense of the myriad other critical environmental problems we face. The problem of radiation, including its relationship to the current conflict over nuclear energy and nuclear waste disposal, as well as urbanization, its related problems, and many other factors have caused environmental changes in recent years. Chemicals, however, are a good example of recent environmental impacts since they have found their way into our land, food, and water, and their production has increased dramatically, as can be seen in figure 1 and in the following U.S. production index for chemical and allied products for the period 1967–77.

Year	*Average production index*
1967	100.0
1968	109.9
1969	120.4
1970	120.2
1971	126.4
1972	139.3
1976	169.3
1977 (December)	183.0

NOTE: 1967 is the base year.
SOURCE: Reference 5a.

The uses of new chemicals are currently increasing at rates greatly exceeding those for previous years. And although, as shown in figure 2, a number of known or suspected cause-and-effect relationships have been found between some of the new chemicals and health,

Figure 1. Historical growth of the synthetic organic chemical industry.

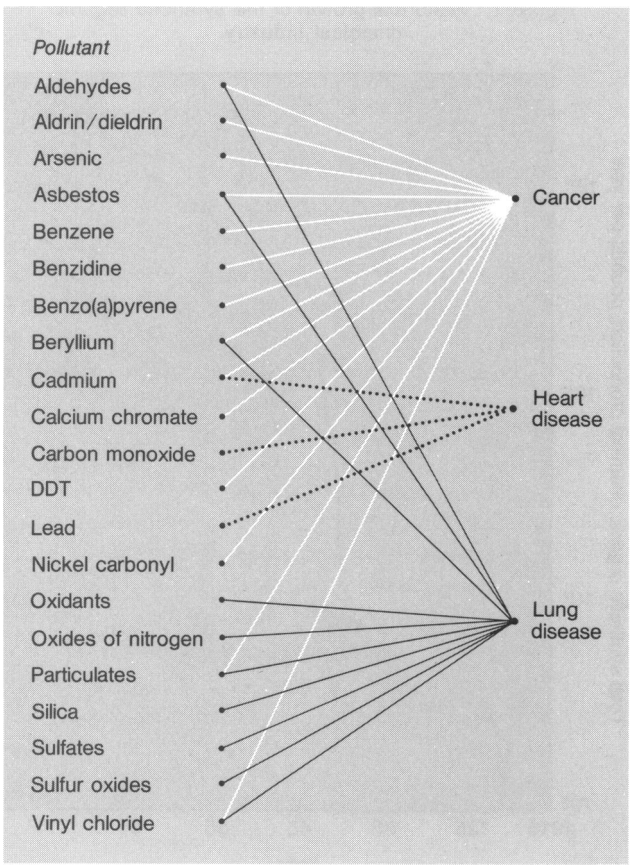


SOURCE: Reference 1c. (Chart was based on U.S. Trade Commission reports on production and sale of synthetic organic chemicals, 1918–76.)

the medical and scientific communities have been unable to determine possible adverse health effects as fast as industry can produce and distribute the new chemicals. Under the Toxic Substances Control Act of 1976, the Administrator of the Environmental Protection Agency may require testing of new chemicals before they are released for use. However, the implementation scheme provided by this act is only beginning, and the lag time in assessing chemical impacts is significant. With present assay methods, the testing of one chemical may take 3 years or more, and the costs are substantial. Because of this imbalance between industrial and governmental efforts, the adverse effects and the persistence of some chemicals have been, and will probably continue to be, discovered only after the fact and after the chemicals have been in wide use for a number of years.

Infants and children constitute a special target group for whom the chemical products and byproducts of our society have special implications. Because of the processes of maturation and growth, this group's systems and environments are often qualitatively or quantitatively different from those of adults. The environmental impacts of chemicals on different age groups may be immediate or delayed, and indeed may have profoundly different effects at different points in life (*6*).

Figure 2. Known or suspected links between selected pollutants and disease.



SOURCE: Reference 1d.

The evaluation of the environmental impact of chemical products and byproducts upon the growing human organism presents a real challenge. Some teratogens actually have multiple effects, depending upon the stage of development of the organism when exposure occurs. An agent may cause abortion at the earliest stage of embryonic development, produce some type of malformation during organogenesis, and later result in neoplasia. Thus, the fetal response to many teratogenic agents is difficult to determine and may often go undetected.

Fraumeni has noted that about 2 to 3 percent of all congenital malformations in humans can be attributed to drugs or other chemicals in the environment (*7*). He also noted that cancers may result from chemical exposures in the prenatal period, the best example being the treatment of pregnant women with stilbesterol, which has been linked to the development of vaginal cancer in their daughters. Unfortunately, since the vast majority of birth defects are from unknown causes, the contribution of the environment to this tragedy has not been elucidated. It is probably much greater, however, than the estimates indicate.

The chronic disease impact of chemicals is thus not limited to adults. We cannot ignore their potential for serious adverse effects on infants and children. The effects on this group may indeed have greater public health significance, since when a young person avoids disease or death, he or she has more potential years of productive life left to live than when an adult manages to escape them.

Available evidence demonstrates that the chronic disease problem involves a complex of pollutants, exposures, susceptibilities, and individual manifestations. The complex interaction and the variable manifestation can be understood better if one examines the manner in which a given carcinogen will likely behave. One way is to produce mutation in the DNA, another is to suppress the immune system, a third is to stimulate proliferation of the tumor cells themselves. Evidence suggests that exposure to single agents not only is additive and cumulative, but also that in exposures to two or more agents, these agents often interact to produce effects that each is incapable of producing alone. For example, asbestos and cigarette smoke each

can produce lung cancer independently, but the lung cancer rate among smokers who have also been exposed to asbestos is much higher than mere double jeopardy would suggest. These interactions, coupled with the prolonged latency periods of the chronic diseases—up to as much as 40 years for cancer—make it obvious that special steps and skills will be needed not only to determine the extent of the relationship between these diseases and the environment, but also how they can be prevented. The chronic degenerative diseases thus differ from the acute diseases of the past in a number of respects: "Specifically, chronic diseases are long-term in their development, multifactorial in their origin, and when clinically manifest, are associated wth structural changes in the target organs. These diseases are at best minimally, if at all, reversible and at worst progressive, despite therapy" (*8*).

Even though the relationship between cancer and the environment may be our greatest threat, the relationships between the environment and other chronic diseases also deserve attention. The 1978 report to Congress by the Task Force on Environmental Cancer and Heart and Lung Disease provides information on the relationship between the environment and heart and lung disease. This task force reported that there is "enough evidence of an environmental impact upon heart disease to suggest environmental intervention as a preventive medicine measure" (*1e*). It noted that although it is true that the mortality for heart disease has been declining, there is no evidence to suggest that the same is true regarding the morbidity for heart disease. Because the heart is not a direct target organ of hazardous substances and, also, because there is no closely analogous animal model for human coronary disease, environmental impacts upon this organ have largely been assessed by descriptive epidemiology related to population groups. The result has been that environmental pollution cannot be identified as a direct cause of heart disease. Many scientists believe, however, that such pollution may aggravate preexisting cardiovascular conditions. For example, the higher morbidity and mortality rates for heart disease found in areas of high air pollution as compared with areas of low air pollution may reflect the impact of sulfur dioxide, nitrogen dioxide, oxidants, or other environmental elements. Carbon monoxide is one air pollutant for which there is statistical evidence to support the contention that environmental pollution can aggravate heart disease. Other suggestive evidence of an environmental impact on heart disease includes the statistical association between soft drinking water and elevated mortality rates for cardiovascular disease; between smoking and increased heart disease mortality; and between cadmium concentration and death rates for hypertension and arteriosclerotic heart disease.

Likewise, the 1978 task force report points out the impact of environmental factors on respiratory diseases, currently the sixth most prevalent cause of death in the United States. Epidemiologic findings suggest causal relations between pollutants in the ambient and occupational environment and (*a*) an increase in chronic respiratory disease mortality; (*b*) an increase in chronic bronchitis morbidity; (*c*) reduced expiratory flow in adults; (*d*) pneumoconiosis; and (*e*) the failure of pulmonary function in children to improve during growth (*1f*).

Environmental Concerns in Mental Health

If environmental health professionals are actually going to promote the public health, it is essential that they use the World Health Organization's definition of health—complete physical, mental, and social well-being, not merely the absence of disease. Most of the efforts and orientation of environmental sanitarians have been directed at manifestations of environmental factors in people's physical health. However, we need to be concerned with positive mental health as well, since mental illness is another critical health problem.

In 1977, 4.4 percent of all patients in short-term general hospitals were discharged with a diagnosis of a mental disorder (*9*). This ratio would increase to 12 percent if second or third discharge diagnoses were included in the count. Somewhere between 15 and 20 percent of the U.S. population is affected by mental disorders. Their social cost in 1971 amounted to some $25 billion. What proportion of these disorders is related to toxic chemicals, stress, poverty, or other environmental factors? We do not know, but how the population copes with environmental stresses is an issue that environmental sanitarians should address.

Even researchers designing studies of mental health based on the host-environment-agent concept of disease causation have generally neglected the study of the environment. The possible mental health consequences of environmental degradation have not received much attention. And even when the environment has been considered, the psychological environment is what has interested the mental health profession, rather than the physical environment with its physical pollution problems (*10*). Part of the difficulty in specifically looking for a relationship between mental illness and the environment is that the literature in this area is particularly sparse, and the methods used in whatever research

has been undertaken generally have been weak. "The complex processes through which degraded aspects of the physical environment affect man's mental health are poorly understood. Aside from the literature on lead, there is little which can be said with confidence on the effects of pollution and the deteriorated physical environment on mental health" (*10*). However, the relatively new multidisciplinary approaches adopted in behavioral toxicology research reflect a growing concern in this area. Also, although human behavior is a complex phenomenon that is difficult to study, it is known that toxic chemicals can affect behavior. Schuster, for example, has reported (*11*):

> The behavioral consequences of exposure to heavy metals, pesticides, organic solvents, and carbon monoxide are most frequently cited as illustrations of behavioral and neurological toxicity. The recent episode with kepone . . . points out the importance of behavioral toxicity evaluation. The impact of noise pollution on sensory and behavioral parameters has been the subject of considerable research. . . . That more subtle psychological effects may be attributable to environmental toxicants is suggested by a recent report on the effects of exposure to organo-phosphate pesticides. Commercial sprayers of organophosphate pesticides had significantly higher anxiety scores on a standardized test than controls. In all other respects these workers were asymptomatic. Diffuse anxiety and similar subjective complaints are rarely considered as a possible consequence of contaminant exposure and traditional epidemiological studies fail to detect them.

Klebba pointed out that in the period 1960–74 there was an upward trend in homicide rates in the United States (*12*). Since homicides basically reflect a behavioral problem, this trend can be considered further evidence that mental health problems are becoming increasingly significant in our communities. Whether or not environmental adaptations contribute to a person's acting out in this manner (that is by killing someone) is a subject worthy of consideration. "If ugliness—the least human physical environment—contributes to the emotional breakdown and mental illness, it is an environmental health problem just like sewage-contaminated water" (*13*).

The single cause and effect theory of the bacteriological age has been expanded to recognize that although disease does not occur in the absence of a given disease agent, it does not necessarily occur when the agent is present. One variable of particular concern in the disease cycle is stress—physical, social, and individual. Pesznacker and McNeil have noted that genetic factors, nutrition, immune mechanisms, social roles, stress, socioeconomic status, personality, climatic and atmospheric conditions, and many other factors may operate and influence individual susceptibility to illness (*14*):

> Impressive positive relationships between stressful life situations and the occurrence of physical and/or emotional illness have been demonstrated, and the fact that illness tends to cluster during or following periods of stress has been recognized. Beginning in 1949, Holmes [T. H. Holmes, MD, University of Washington School of Medicine] and his associates have done a great deal of research in this area which indicates illness is often associated with coping or adaptive behavior on the part of the individual involved.

At least two aspects of mental health need to be considered by environmentalists. First, does the environment provoke stress that significantly contributes to what might be considered a body burden of life adaptation, thus precipitating an illness that is just waiting for an opportunity to occur? This question is extremely difficult to answer. Second, does an environmental exposure itself cause a direct manifestation of some type of mental disorder? Behavioral toxicology addresses this question, and as noted, there is evidence that the answer is affirmative.

Recent research dealing with the relationship of the manmade environment (for example, housing) to health seems to support the hypothesis that the social, rather than the physical, environment is the primary determinant of health, at least for people living in urban areas. The physical characteristics of the buildings people live in, their surrounding neighborhoods, and their cities may actually only be secondary in disease causation to the "habits, attitudes, and behavior that a person learns from the social milieu in which he grows up" (*15a*). A renewal and relocation effort carried out in Boston's West End has provided strong evidence that this hypothesis holds true. Fried (*16*) documented "grief" syndromes among those forced to relocate. The disaster in planning at the Pruitt-Igo housing development in St. Louis, Mo., is another example of improving the physical, but not the social, environment.

Thus, apparent improvements in the manmade environment may have adverse, rather than positive, impacts on people's health and behavior. In concentrating on the physical manifestations of health and zealously attempting to improve housing and land use, this important concept may be overlooked. This statement, however, does not mean of course that obvious physical hazards should not be eliminated or mitigated. Accidents, fires, and certain illnesses are more likely to occur if the physical conditions for them to happen exist. Nonetheless, even in these instances, an apparently strong behavioral component is at work (*17*).

The socialization and education of children living in poorly designed housing developments were examined by Spanier and Fishel (*18*). Because the results indicated that high-rise structures could disrupt familial functioning, these authors pointed out that

more adequate consideration needs to be given in environmental planning to the social and mental health effects of environmental changes. Hochstim and associates found a persistent sense of anomie among residents of a defined poverty area regardless of such variables as income and race (*19*). This feeling may well have been a manifestation of environmental stress.

In the legal sense, we have for years had an element of mental health built into our environmental health work without perhaps realizing it. By means of nuisance laws, those factors that interfere with the use and enjoyment of land (certainly a perceptual element) have long been within public health protection. Two interesting court cases were won by the plaintiffs at least partly on the basis of mental health considerations. *Brandes* v. *Mitterling* in Arizona was probably one of the first airport noise cases (*20a*). In the second case, *Powell* v. *Taylor* in Arkansas, the case notes read as follows (*20b*): "The modern tendency to expand equity's protection of aesthetics and mental health has led the majority of jurisdictions to bar funeral homes or cemeteries from the residential sanctuaries of ordinary sensitive people, 4 Ark. L. Rev. 482. These decisions rest not upon a finding that an undertaking parlor is physically offensive, but rather upon the premise that its continuous suggestions of death and dead bodies tends to destroy the comfort and repose sought in home ownership."

It seems reasonable to assume that if, at least in a legal sense, such environmental components can have mental health impacts, as brought out in these and other court cases, such changes perhaps also can be responsible for adverse behavioral responses in some susceptible people. Certainly these have been concerns in the occupational setting for some time.

In summary, "the effectiveness of human interactions, the facility with which these are carried out, the degree to which a portion of the manmade environment abets or deters the social functions for which it was intended, the constraints that it places upon human behavior, and the pleasure or satisfaction that it provides for those who use it, might vary widely with different environmental designs, and the measurement of these variables may become quite important" (*15b*). It is time to expand our traditional definition of the environment to include the psychological and social forces underlying human health and well-being.

Strategy for the Future

Some of the major factors in the interactions between the environment and chronic disease can be summarized as follows (*8*):

1. Health hazards are often associated with long-term exposure to environmental agents in concentrations too low to produce rapid adverse responses.

2. The current hazards are primarily chemical rather than microbiological.

3. Environmental agents from multiple sources can interact with one another and with man to cause unexpected effects.

4. Cause-and-effect relationships are often hidden and complex.

These factors do not make work in environmental health easy. They make it difficult to obtain adequate funding for advancing program work into the area of chronic disease. Better data and hard facts are needed to open the way for environmental sanitarians to function in this area. Fundamental information, a scientific basis for criteria and standards, better assessment techniques in chronic disease and mental health, and a full understanding of the major social and economic implications of control measures are required for effective program development and implementation.

Chronic health conditions and mental health problems are fuzzy areas to many people—vaguely threatening as having potential or eventual impacts on health, but not too worrisome in these days of inflation when prices at the grocery store are a more important concern to many people. As noted in an article in the journal Lancet, "almost any protective measure is liable to make work harder or longer or more complicated and expensive. Industry has shown that unless the risk to be avoided is both grave and obvious, most people prefer to believe that they are the lucky ones" (*21*). Furthermore, in the industrial setting and generally in community pollution control efforts, guidelines or standards are set to limit exposure to a given agent to a "safe" level. But determining "safety" is a political, not necessarily a health-oriented process. Society's values determine what is safe by judging when risks are acceptable (*5b*). Three major premises must be accepted if grassroots environmental sanitarians are to reduce the mortality and morbidity from chronic disease and mental or behavioral dysfunction. First, efforts will have to be directed not against a specific disease entity, such as *Salmonella typhi,* but against as yet ill-defined interacting chemical, physical, and sociocultural insults. Second, a great deal of political cooperation will be necessary. Third, an effort of a scope as yet untried by this profession will be needed to effect behavioral change.

Those environmental sanitarians who rely exclusively on observations, evaluations, and regulations will need

to expand these skills and work in cooperation with those who have expertise in new areas. Our future problems will not be technical only. In fact, the technology to control, reduce, or otherwise mitigate chemical threats is generally within our grasp. The population, however, must indicate that it is willing to pay the price for public health. Even when technical solutions elude us, we must raise the level of public awareness so that the funds will be forthcoming to conduct the research needed to reach the solutions. If the public is to understand, accept, and appropriately modify those of its interactions with the environment that are related to chronic and mental disease, it is going to need more facts. An expensive and difficult educational campaign lies ahead. That campaign will have to be more effective than what has been called environmental health education in the past. It is doubtful that the effectiveness or efficiency of much of what we now do educationally has ever been documented by good research. If we were more effective, the public would know a lot more than it does now about public health departments in general and about environmental health practitioners and environmental health problems in particular.

Dissemination of information is essential, but of course we must first have the information. The unknown variables in the problem areas of environmental health are numerous. Some of us will have to strengthen our specific research skills and search for the disease links in the environment. Talented young people in the environmental health field should be encouraged to channel their efforts into disciplines such as environmental epidemiology. Proven performers who can get a job done in the allied health professions and the behavioral sciences should be persuaded to study environmental health problems. Only with sufficient people power can we discover what we need to know and transfer this knowledge to target groups and the public in general.

Goldsmith and Huxley have discussed the need for increasing the public's knowledge and options (*22a*). They have also given perspective to the awesome magnitude of such a task by noting that the likely cost of an effective and massive educational effort would be close to a billion dollars. Since they envision mass behavior modification programs as the core of health education efforts focusing on noninfectious diseases, a number of ethical issues will be raised as we attempt to sway individual behavior for "beneficent modifications" with the same techniques the marketplace uses to promote what we public health sanitarians define as "maleficent modifications" (*22b*).

Not only must our techniques and efforts expand in scope, but also our job bases. We environmental sanitarians must infiltrate, if you will, other areas. Goldsmith has long promoted our involvement with HMOs (health maintenance organizations) (*23*). And what better place to start getting the sound data we need for establishing the relationships that we seek? Also, what better way is there than this to open the essential dialog with the people with whom we must form teams to fight chronic disease? We need to seek out the physicians, the nurses, the engineers, and the health educators, wherever they are in our communities, and begin working with them. It is time for us to demand a concerted effort on the part of industry, government, and our health partners. The age of territories must end. The free exchange of information must be promoted. It will be necessary to collect some basic information through better data systems, but this collection will be possible only if the various disciplines cooperate. Incidentally, one goal for the National Environmental Health Association should be to become more familiar with the data bases that currently exist in every community, every State, and the nation. We environmental sanitarians should be at the forefront in identifying the links between the environment and chronic disease—not on the sidelines waiting for information.

Obviously, establishing better data bases, undertaking research, setting up communication channels, working as teams, and modifying behavior take time and money. And convincing political leaders that these activities are as important as immunizations, platting, and restaurant inspections will not be easy.

As was stated in an editorial in the Journal of Environmental Health (*24*): "We in the National Environmental Health Association must, therefore, broaden the scope of our training and activities so that we can meet the new challenges of environmental health as well as maintain the surveillance and control of the old existing problems." In actuality, however, we may not be able to do it all—both the old and the new. And if called upon to choose one or the other, will the comfort of familiar routines outweigh the challenge of new endeavors? Although some old and some new programs are likely to characterize the future, do we really need to maintain all the old programs? What tradeoffs can we make in order to put a real dent in morbidity and mortality? How often have environmental sanitarians evaluated their programs to see if relevant needs were being met to any significant degree? If we had facts and figures to present to the lawmakers, our efforts to modify our direction would be enhanced.

The strategies for controlling both old and new environmental threats may need to be different than the regulatory approaches of the past. Schneiderman notes (*2b*) that improvements may come by (*a*) the government doing something for everyone (for example, air pollution control); (*b*) people doing something a few times in their lifetimes (for example, immunizations); and (*c*) people doing something every day (for example, wearing seat belts). If we concentrate only on one factor, we will miss a large element of possible risk reduction. Also, we may fail to understand our enemy. As the comic strip character Pogo once stated, "We have met the enemy, and he is us!" Individual perceptions and definitions of the problems we face vary. And it is the individual who goes to the polls. It is the individual who can make statements that will sway policy decisions. If we want to push prevention as being as essential as treatment, we will have to anticipate and deal with the reactions both of the individual and of the public as a whole. Individual opinions are important, particularly when they are expressed by members of the community power structure. Thus, another area to which environmental sanitarians will need to devote more time is studying the dynamics of community change.

Environmental sanitarians face a great challenge. Our skills and strategies may need polishing, but we have the potential to become key facilitators of change for better health.

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